# Trail Blazers, Inc. Comments on
# Mountain Lakes Fishery Management Plan/EIS
**4/16/2003**

## INTRODUCTION

Trail Blazers are pleased to submit comments on the preparation of a North Cascades National Park Service Complex Mountain Lakes Fisheries Management Plan/EIS. These comments are based on personal experiences, data accumulated and knowledge derived during 70 years of assisting the Washington Department of Fish and Wildlife (WDFW) and predecessor agencies manage high lake fisheries. This assistance has included: egg taking, money for maintenance and equipment, carrying and stocking of trout fry in lakes, collecting fish observation data, and building a high lake and stream database that handles data on: lake and stream identity, location and physical characteristics, fish stocking, fish observations, water chemistry, water biology and recreational use. These data are extensive and are summarized in the section on Alteration of Lake Ecosystem Dynamics.

Trail Blazers comments in the following letter follow the outline of the Preliminary Scope and Content document provided at the public meetings. The Trail Blazers comments are in larger font and follow the smaller font and italics in parenthesis text provided in the Preliminary Scope and Content document.

## PURPOSE

- *(The purpose of taking action at this time is to develop a new management plan for mountain lakes in order to conserve native biological integrity and provide a spectrum of recreational opportunities and visitor experiences, including sport fishing.)*

Trail Blazers have concerns that since the missions of NOCA and the adjacent Forest Service land managers are different, a NOCA Complex mountain lake plan is not necessarily appropriate for managing mountain lakes outside the NOCA boundary. Therefore **Trail Blazers recommend that the phrase "mountain lakes" be replaced with "NOCA Complex mountain lakes"**.

## NEED

- *(There is an opportunity for action at this time because research studies are available that can be applied to a new mountain lakes fishery management plan in accordance with the Memorandum of Understanding and Consent Decree.)*

Trail Blazers agree with the concept of all data pertinent to the NOCA Complex mountain lakes being used to develop and implement a fishery management plan, as opposed to a political solution based on balancing competing interests or fiat based on some overarching philosophy. These pertinent data should include not only the specific research studies commissioned to try to answer specific fishery questions but also data from all sources including: National Park, state and federal Fish and Wildlife, Forest Service, USGS, EPA, Universities and volunteer organizations. Therefore **Trail Blazers support the continued collection and management of physical/chemical/biological and human use data to better understand and manage the NOCA Complex mountain lakes ecosystem.**

Trail Blazers understand that the mountain lakes do not exist in isolation from nearby ponds, seeps, wetlands, snow and ice fields, inlets, outlets and downstream reaches and adjacent riparian areas. Therefore **Trail Blazers believe that all the waters in the lake basins together with species migrating in and out of the basins and pollution from sources miles away should be studied as a system**.

Considering existing resources and organizational structures, Trail Blazers understand that it is not possible for any one organization or program to address the entire NOCA Complex mountain lake ecosystem. However, we believe that the data collected by each organization for each program has value outside of that program and should be organized and managed so it can be

accumulated and merged and accessed by all organizational entities and programs with a need to understand and manage some portion of that ecosystem.

Therefore, **Trail Blazers support the establishment and continued maintenance of a NOCA Complex Data Management System that captures, organizes, stores, and makes accessible all data relevant to managing the NOCA Complex mountain lakes ecosystem**. Furthermore, **Trail Blazers recommend inclusion in the NOCA Complex Mountain Lakes Management Plan a data management section that specifies protocols for how data collected under the plan are to be formatted and delivered for importing into the NOCA Complex Data Management System. These data would include field observations and laboratory sample results in addition to summary data.**

## OBJECTIVES

- *(To obtain agreement with and support from interested parties and groups to implement a new management plan for mountain lakes.)*

**Trail Blazers agree with and support the development of a NOCA Complex Mountain Lakes Management Plan on a lake by lake basis using all pertinent available data.** Trail Blazers participated in the development of a state wide management plan for mountain lakes by WDFW (Reference 1) and believe that the 70 years of experience and information gained and developed by WDFW and its predecessor agencies and volunteer organizations constitutes probably the largest body of knowledge in the United States, if not the world, regarding managing mountain lake fisheries. This knowledge is used to manage 1793 fish-bearing high lakes (Reference 1 page 5-9) out of a total of 4718 high lakes and ponds (Reference 1 page 1-4). The WDFW defines a high lake as a lake or pond at an elevation of 2500 feet or above west of the Cascades or over 3500 feet east of the Cascades (Reference 1 page 1-2). Therefore **Trail Blazers recommend that NOCA Complex managers carefully study the data developed by WDFW for managing mountain lakes in the state.**

**Trail Blazers appreciate the willingness of NOCA Complex managers to actively seek input from state agencies and interested private organizations during the establishment of a high lakes management plan for NOCA Complex. The best plan will be the one that addresses the concerns and ambitions of all stake holders in the complex. We ask to be heard and to have our input fairly treated without preconceived priorities or objectives dominating the process. *We* know the story of responsible management of the high lake resource by WDFW and its volunteer organizations is a excellent one: one that not only continues to provide the superb recreational opportunities that existed before the park's formation, but also does so in an ecologically sound manner. That story simply needs to be heard and understood (Reference 1).**

- *(To advance the protection and rehabilitation of native biological integrity by maintaining native species abundance, viability and sustainability.)*

Trail Blazers support the basic concept of protecting and maintaining native species abundance and viability in an ecosystem.

Trail blazers understand certain non fish species in NOCA Complex mountain lake basins are sensitive and have been or could be impacted by the stocking or introduction of fish during the last 100 years (where introduction is defined as fish stocked once that are now able to sustain themselves through natural reproduction). Trail Blazers also understand certain fish species in downstream reaches from NOCA Complex mountain lakes could be sensitive and impacted by fish migrating or entrained out of mountain lakes.

**Therefore Trail Blazers support examining the existing and future data on a lake by lake basis and associated ponds, waters and downstream reaches to determine if there is a reasonable potential for fish to impact other species of concern either in the lake basin or in downstream reaches. Furthermore Trail Blazers would support removing any lakes and**

**ponds from fish management where data show the fish are causing a harmful and irreversible (or unmanageable) effect on sensitive species.**

- *(To provide a spectrum of recreation opportunities, including sport fishing, while minimizing impacts to the biological integrity of natural mountain lakes.)*

Trail Blazers agree with the objective of providing a spectrum of recreational opportunities while minimizing impacts to the biological integrity of the NOCA mountain lakes. **Trail Blazers, Inc. was formed in 1933 to assist the newly-created Washington Department of Game in providing "better alpine fishing".** However, Trail Blazers love the mountain areas and engage in a variety of recreational activities including: fishing, hunting, hiking, climbing, skiing, photography, and wildlife viewing. Trail Blazers consider themselves very fortunate to be able to enjoy a variety of nearby public lands. However the NOCA Complex has unique characteristics of ruggedness and remoteness that appeals to many anglers as well as climbers and hikers. It is a rare opportunity for people to be able to enjoy hiking and climbing in the NOCA Complex, with some preferring to carry a fishing pack rod along and be able to cast and land a beautiful fish in clear waters reflecting rugged peaks.

Many of us grew up in families that went to the mountains not only for recreation but to supplement their food supply by fishing and hunting and gathering and to maintain traditions of independence and resourcefulness learned from their ancestors. In fact early fish and game management in the Northwest was geared toward supplementing food sources. Improved social and economic conditions made it less necessary for mountain lakes to be looked at as a food source so activities evolved from food toward sport and to some extent ritual. Many people want to continue outdoor traditions taught them by their parents and pass these down to their children and grandchildren.

- *(To apply science/research in decision-making at multiple spatial scales, including the landscape, watershed, lakes cluster and individual lake levels.)*

Trail Blazers strongly agree that decision making needs to be made at multiple spatial scales; however, there can be confusion over what ecosystem scales should be used in making any single decision. For example, the following table shows various scales based on USGS hydrologic unit definitions.

| **Ecosystem Scale** | |
|---|---|
| 1 | A lake |
| 2 | A USGS 8$^{th}$ level basin (subcatchment). These are not yet defined for the NOCA Complex but would be approximately the scale of a lake basin or EPA/USGS river reach at the 100k map scale (example Wild Lake drainages) |
| 3 | A USGS 7$^{th}$ level basin (catchment) which are now being defined for the NOCA Complex (example Goodell Creek-above and including Crescent Creek) |
| 4 | A USGS 6$^{th}$ level basin (subwatershed) which have been defined for the NOCA Complex (example Goodell Creek), |
| 5 | A USGS 5$^{th}$ level basin (watershed) which have been defined for the NOCA Complex (example Skagit River from Alma Creek to Gorge Lake drainages) |
| 6 | A USGS 4$^{th}$ level basin (subbasin) which have been defined for the NOCA Complex (example Skagit River from Baker River to Canadian border) |

Trail Blazers understand there is no evidence for native fish species in high mountain lakes isolated by physical barriers from the ocean after the last ice age, including all lakes in NOCA outside the NRA. However if a 5$^{th}$ level basin ecosystem scale is used, it could be argued that trout native to the Skagit River below Gorge lake would also be native to Goodell Creek and Wild Lake.

Another example of the importance of considering ecosystem scale is the likely existence of natural refuges for the re-colonization of semi-aquatic species, and even aquatic species, that exists at the catchment level (USGS 7th level basin) which would not be obvious if one restricts one's view to a lake in isolation.

Trail Blazers support the concept of analyzing mountain lakes in conjunction with related bodies of water and the adjacent landscape. Trail Blazers developed a database to help them manage their volunteer fish stocking activities with the WDFW. The database recognizes that the lakes are connected through a surface and groundwater hydrology, hence the database defines lake and stream reaches and their connections. These reaches are then organized into a hierarchy using the eight level USGS binomial system consisting of: Region, Sub-region, Basin, Sub-basin, Watershed, Sub-watershed, Catchment, and Sub-catchment. A Reach is the smallest unit and is defined at this time to be the same as a Sub-catchment. Future versions of the system defined at the 1:24,000 scale may provide a ninth or even tenth level for use. This structure allows water related data to be analyzed at any of eight levels of hierarchy. **Trail Blazers recommend that the NOCA Complex data management system be organized by a hydrologic hierarchy so that data can be analyzed at any of 8 or more levels.**

- *(To provide full and open access to available information to the public and interested parties.)*

Note: This objective is confusing. It is presented in the context of the Purpose of the EIS – to develop a new management plan for mountain lakes but it could also mean an objective of the EIS process is to be full and open. The following comment assumes this objective refers to the purpose of the EIS and not to the EIS approach itself.

**Trail Blazers support a management plan that provides full and open access to available non-sensitive information**. It is our experience that information that directs too many people to sensitive areas can have a very deleterious effect on fish, vegetation, and other sensitive species. The worst offenders in this regard have been hiking, fishing and climbing guide books with nice pictures and enthusiastic descriptions that focus people's attention on a relatively few areas. Another potential problem would be the widespread dissemination of fish stocking and survey data that focuses people's attention on specific quality fisheries. It is Trail Blazers opinion that members of the public who are interested in quality fishing and hiking or climbing experiences either join one of the organizations in the area that have qualified programs to stock and survey lakes, maintain trails and clean up garbage, and provide education on safety and minimizing impacts on the environment, or explore and find areas on their own.

- *(To provide opportunities for full and open participation by the public and interested parties.)*

Note: Again this objective is confusing. The following comment assumes the objective refers to the purpose of the EIS and not to the EIS approach itself.

Trail Blazers support the addition of a management plan objective that provides participation by interested parties. For example:

"**To coordinate and cooperate with relevant fish and wildlife agencies and public interest groups**".

Trail Blazers have demonstrated over the decades that a group of dedicated, organized and trained people can provide valuable help in mountain lake fish management. Trail Blazers take great pride in their service over the last 70 years in helping the state manage mountain lake fisheries. The Trail Blazers database show 7,088 person-stocking trips (number of stocking trips performed by Trail Blazers times the number of persons on trip) from 1934 to 2002. The database also shows 4,360 person-survey trips (number of survey trips performed by Trail Blazers times the number of persons on trip). Trail Blazers also have worked closely with the WDFW on a variety of projects including: facilities equipment and maintenance, egg taking, and database development and update. Of course, Trail Blazers and WDFW have also learned that training and monitoring must be an integral part of the participation and that much participation is most efficient, effective and reliable when done as a group rather than as individuals.

## PRELIMINARY ISSUES

### Alteration of lake ecosystem dynamics

*Non-native fish have measurably changed lake dynamics and biological composition, including:*

- *(Behavior. Introduced fish are associated with changes in amphibian behavior. Lakes with introduced fish are observed to have fewer amphibians present during the daytime, presumably due to the threat of predation.)*

Trail Blazers agree that introduced fish can change the behavior of amphibians. However, the extent of this behavior change is a function of the physical characteristics of the lake, lake productivity, fish stocking cycle and density, fish reproduction potential, etc. Trail Blazers support a lake by lake analysis to determine whether a sensitive amphibian population exists, or is at such a low level that its viability is threatened by the presence of fish.

- *(Abundance. The abundance of native aquatic organisms (e.g. large-bodied zooplankton, salamanders, aquatic insects and crustaceans) has been reduced by fish predation in some lakes.)*

Trail Blazers agree that high density fish populations can impact the abundance and diversity of aquatic organisms they prey on. That is why Trail Blazers together with the WDFW have monitored and recorded the results of mountain lake fish stocking and introductions since the beginning of recorded fish introduction history. These records, summarized in the table below, are extensive and allow WDFW biologists to better manage the numbers, cycle and species of fish introduced. This management method has greatly reduced impacts of fish on native organisms and provided a higher quality trout fishery. High lake fish stocking densities prior to 1933 (the year the Washington State Game Dept. and Trail Blazers were established) often exceeded 1000 fish/acre. High lake fish stocking densities managed by the WDFW and predecessor agencies have trended down over the decades and ranged from about 70 to 110 fish/acre during the 1990s (Reference 1 Figure 4). (Note: this extensive database can also be used to help identify and prioritize lakes for restoration.)

| Area | TB Stocking Records | TB Survey Records | Comment |
|---|---|---|---|
| NOCA non RA | 217 | 570 | NOCA Complex lakes outside Recreation areas |
| NOCA RA | 119 | 340 | NOCA Complex lakes inside Recreation areas |
| High Lakes | 12,390 | 11,709 | All high lakes in Washington |

- *(Nutrient cycling. Introduction of fish can cause changes in nutrient availability and cycling. Any introduction of fish will have an impact on the natural trajectory of lakes including nutrient changes.)*

**Trail Blazers support the concept of not stocking fish in waters that have never been stocked to maintain some waters in their essentially natural state for this and future generations for philosophical, aesthetic and research purposes.** However, Trail Blazers believe that the natural chemical state of many lakes has already been changed by historic activity and that attempts to restore the natural chemical condition of lakes by removing fish will be marginal at best, at least for the foreseeable future. **Trail Blazers support research on those lakes that once had fish but were allowed to go fishless to better understand how the chemical condition of these lakes respond, before attempting to remove fish on the assumption that the "natural condition", whatever that was, will be restored.** Trail Blazers also support political and administrative efforts to control chemical impacts including: air pollution sources and water pollution from abandoned mine lands.

### Effects of reproducing fish populations

- *(Lakes with reproducing trout populations are often overpopulated with small fish. Populations that possess multiple age classes, occupy multiple trophic levels and occur at high density can have widespread impacts on the biological integrity of lakes. Impacts from reproducing populations are typically greater than introduced sterile fish because many levels in the food chain are affected and the confounding effects of reproduction enlarge the scale for impacts.)*

Because of historical fish introductions, some lakes contain stunted reproducing fish populations that impact the biological integrity of the lake's aquatic community. Thus WDFW and Trail Blazers have long recognized the need to control over-reproducing populations. This recognition has resulted in several research efforts and field programs to determine effective methods of control while at the same time not doing any more harm. WDFW has researched chemical methods of control. Trail Blazers have participated with WDFW in biological field programs to test controlling reproducing stunted populations using aggressive functionally sterile fish to prey on the stunted populations. These lakes are being surveyed annually to determine the efficacy of these biological controls. (Reference 1 pages 5-115 to 117)

**Impacts to riparian zones**

- *(Shorelines around lakes (riparian zones) are sensitive to trampling. Effects related to trampling include erosion and sedimentation, alteration of plant communities, and reduction in food and nutrient inputs to lakes and creeks. Anglers may spend up to three times more time in riparian zones than other user groups. Impacts related to user behavior are not isolated to anglers, but extend to other user groups such as stock users and hikers.)*

Trail Blazers agree that trampling due to anglers, hikers, climbers and horses can negatively impact shorelines and support education and closures of sensitive lake areas to walking and camping at more heavily used lakes. Trail Blazers have cooperated with the Forest Service to develop trailhead signs that educate and encourage all users to travel light on the land. Approximately three fourths of the lakes not in the Recreation Areas that can be stocked under the current MOU with the WDFW have no trail and are difficult to reach because of distance and rugged terrain. Hence these lakes (like Diobsuds, No Name and Skymo) receive relatively few visitors during a season for any recreational activity and impacts to the riparian zones are minimal, and usually undetectable.

Trail Blazers disagree with the Overnight Use Near Park Lakes with Fish statistics developed using Cross Country Zones. Many of the zones do not take into account the difficulty in moving from one side of the zone to the other. For example the statistics showing an average of 34 persons using Diobsud lakes and Hi Yu lake does not take into account that the lakes are separated by rugged terrain on Bacon Peak. Trail Blazers members stock both of these lake basins and have climbed bacon Peak and from personal experience, it is safe to say that very few people have ever made the traverse between the lakes. Hence the numbers of users at each lake would be about half of the 34 estimated even if all visitors went to the lakes. Similarly Doug's Lake is separated from the Quills and Triumph Lakes by Triumph Pass and is a much longer trip, hence person visits to Doug's Lake would be a small fraction of the visits to the Quills. **Trail Blazers strongly recommend that lake use statistics be based on cross country zones that are defined to better take into account the rugged terrain and the natural routes that visitors normally follow; as well as, differentiating between visits to zones vs. visits to lakes.**

Since impacts to the riparian zones most likely depend on ease of access to lakes rather than the specific use that a visitor makes of the lake, Trail Blazers support managing lakes currently with no trails in a trailless category.

Since there is little known about the specific causes or extent of riparian zone impacts, Trail Blazers support conducting further research in this area.

**Impacts to semi-aquatic/terrestrial species**

- *(Fish introduction or removal may have direct and indirect effects on non-aquatic species such as loons and ospreys as well as larger semi-aquatic species such as otters.)*

Like most people, Trail Blazers enjoy the sights and sounds of all wildlife, but the lakes in which we are most interested tend to be at the higher elevations in more remote areas where positive or negative effects on semi-aquatic/terrestrial species due to fish introduction or removal are probably minimal.

**Metapopulation dynamics of salamanders and zooplankton**

- *(A metapopulation is a set of local populations, among which processes of gene flow, extinction and colonization may occur. Metapopulations are of increasing concern in conservation biology, especially with respect to the effects of the fragmentation of intact habitats into small and perhaps disconnected habitat "islands." We recognize that habitat for native biota has been fragmented by introduction of non-native fish. Does sufficient habitat (i.e. unstocked lakes and ponds) remain in the greater landscape to ensure the long-term sustainability of native populations? This landscape scale research question will need to be addressed in the EIS, though data are lacking.)*

Trail Blazers agree that data are lacking and support continued research into understanding metapopulations associated with mountain lakes. There are hundreds of fishless ponds, not including the many seeps and wetlands, within the NOCA COMPLEX boundaries and thousands in other North Cascade mountain areas.

Appendix A shows the 6$^{th}$ level hydrologic unit code (HUC) basins in the NOCA Complex together with a count of the total numbers of lakes and ponds in the HUC and the numbers of lakes managed for fish both stocked (MOU lakes) and naturally reproducing. The total number of lakes in Appendix A only adds to 530 because springs and wetlands that have been assigned water codes by NCNP were not counted, also the number of small ponds is being revised as new information becomes available.

Appendix A shows that only 21 of the 35 sixth level HUC basins in the NOCA Complex are being stocked with fish or have introduced reproducing fish. Appendix A also shows that out of the total HUC basin area of 1,462 square miles, basins with lakes stocked under the MOU represent 704 square miles while the total area of basins with stocked or reproducing fish is 855 square miles. This means that only a little more than half the basin area in the NOCA complex is managed for fish. Appendix A also shows the locations by basin of the 90 lakes in Appendix B that are considered to have potential for recreational fishing.

**Trail Blazers believe these statistics show the existence of a large number of fishless lakes and ponds for aquatic biota and a large number and area of fishless basins for amphibians under the present NOCA Complex fish management policies.** Furthermore, Trail Blazers are not aware of any data that show amphibians or macro-invertebrates are threatened at the landscape level in NOCA.

**Downstream dispersal**

- *(Escapement and hybridization. In certain lakes, introduced trout may be escaping into the broader watershed and interbreeding with native fish. This could potentially harm bull trout (federally threatened) and native westslope cutthroat trout.)*

**Trail Blazers support stocking functionally sterile fish and not stocking fish that could interbreed or compete with federally threatened or native trout.** The Trail Blazers database contains downstream links for each Reach. This enables analysts to readily understand downstream reaches that may be affected. T**rail Blazers support research that shows which stream reaches contain federally threatened or native trout. Trail Blazers support research that identifies lakes that have downstream barriers that would effectively prevent outlet migration.**

- *(Competition and disease. Introduced fish (both sterile and fertile) compete with native species and have the potential for introducing diseases and parasites.)*

**Trail Blazers support WDFW's routine production of fish intended for mountain lake introductions that are free of disease and parasites.**

**Restoration**

*Restoring a lake may be a two-step process that involves removing the fish first, then reintroducing native aquatic species. (Fish removal methods:*

- *Physical. Removing introduced fish using gill nets can be efficient and effective when visitation is low, lakes are less than 2 ha in size, relatively free of woody debris and are 2-15 M in depth. However, gill nets can capture, injure, or kill birds and other non-target species.)*

Only 16 lakes and ponds with fish are under 2 ha in size and less than 15 m deep. Also they are in remote areas that would require repeated visits by helicopter to carry the required nets for the 3-4 years of netting required.

- *Biological. Introduction of predator fish (e.g. tiger muskellunge) could be considered as a method to remove introduced fish species via predation. However, predator controls could have associated impacts on the environment and visitor experience.*

**Trail Blazers support research to determine the effectiveness and harmfulness of introducing predator fish to control stunted fish populations.** Trail Blazers do not believe the addition of low numbers of predators would create conditions more ecologically stressful than the existing problem fish population (Reference 1, pages 5-116 through 5-136).

- *Chemical. Piscicides (e.g. rotenone, antimycin) could be used to remove fish species when other less-intensive methods such as gill netting are insufficient.*

**Trail Blazers support the use of Antimycin in removing or controlling stunted fish populations in mountain lakes since research has shown this piscicide to be the least harmful among any of the chemical methods, and is very limited in the range of species affected (Reference 1, Pages 5-115 and 5-116 and associated technical references).** Antimycin has been used in Mount Rainier and Crater Lake National Parks to remove non-native fish from high lakes, and to assist in a bull trout recovery program, respectively.

*Reintroduction of aquatic species*

**Lakes that have been rehabilitated to fishless conditions may require reintroduction of certain aquatic species in order to achieve full recovery of extirpated biota.**

For lakes that have been rehabilitated, **Trail Blazers support the reintroduction of fish that would have less impact on the lake ecology. Trail Blazers support, and would be willing to assist in collection and transfer of invertebrates from fishless lakes in cooperation with NOCA biologists.**

**Unsanctioned stocking**

- *(Attempts to remove introduced fish from lakes in other National Parks (e.g. Tipsoo Lake at Mount Rainier National Park) have been illegally thwarted by the careless disregard of private individuals. This very pragmatic concern cannot be overstated: without full public acceptance, unsanctioned stocking could become a vexing management problem.)*

Trail Blazers are on record as an organization being strictly opposed to unsanctioned fish stocking. Members who knowingly disregard this rule are strictly subject to having have their membership terminated.

**Trail Blazers agree that ignorant elements of the fishing public may feel justified, or even helpful, in stocking fishless lakes if they perceive that a high lake fishery does not exist in the NOCA Complex. Providing a scientifically managed fishery may be the best deterrent to this potentially disastrous risk to high lake ecosystems.**

**Visitor experience**

- *Anglers. Many anglers greatly enjoy fishing in the Complex's mountain lakes. A reduction in fish stocking would negatively affect their outdoor experience.*

Most Trail Blazers are avid anglers and thoroughly enjoy the pursuit of trout in beautiful mountain lake habitats. Many also enjoy learning about fish biology and participating in efforts to manage mountain lakes for a quality trout fishery. There are also members who are interested in and understand the importance of survey work, so they fish to observe what is in the lake or let others fish while they take notes on a variety of lake and riparian attributes.

Fishing in the high mountain environment is much akin to hiking and camping in those same environments. Each provides great recreational value while at the same time modifying the natural pristine state of the wilderness. Unless a case can be made for restricting any sort of recreational use of the park, one must balance the positive recreational value of fishing or hiking/camping vs. the impact such uses have. Trail Blazers judge that a scientifically managed

high lake fishery of non-reproducing trout provides an appropriate balance of benefit vs. impact. In fact, it is possible that the benefit/impact of non-reproducing fish in lakes is even better than that of hiking, climbing, and other wilderness uses. Surely most visitors would see fish jumping in a lake as less damaging than the ugly scar of a trail.

- *Non-anglers. Many non-anglers are opposed to stocking in the Complex. A continuation of fish stocking would negatively affect their outdoor experience.*

Some Trail Blazers have been non-anglers and even belong to organizations that are opposed to fish stocking in the NOCA Complex. These Trail Blazers see no conflict in this because they believe that it is possible to have a low impact recreational fishery in remote areas without damaging sensitive species. Other Trail Blazers that do not fish enjoy participating in fish stocking and surveying programs knowing that many of their friends enjoy this activity.

## ADAPTIVE MANAGEMENT CRITERIA

- *The following is a list of the various management criteria that may be considered to adaptively manage lakes and to develop Desired Future Conditions.*

**Trail Blazers strongly support the identification of important basic parameters, the accurate identification of the spatial locations of field observations and sampling stations, and the collection and analyses of observations and samples using the best available protocols.** Historical data should be included and qualified as to the methods used. For management we support the concept of a data centered approach where basic data are structured using modern database and geographic information system tools and techniques.

Comments regarding various management criteria and additions are as follows:

| ***Fishing Opportunity*** | **Trail Blazers Comments** |
|---|---|
| *Access to lakes with fish* | Maintain existing trails to popular lakes. Reroute or deactivate existing informal trails that impact sensitive areas. Do not make new trails to lakes. Monitor use at least on the lake basin level. |
| *Aesthetics* | Lakes could be classified by various aesthetic criteria. However, Trail Blazers believe that this type of information should be limited to non-sensitive areas because it can focus too much attention on sensitive areas. |
| *Stock species* | Species that have been found to do well in the lakes of a certain type based on catch records should be used. Research should be supported on how various species perform in the NCNP environments. |
| *Catch rate* | Various catch rates should be available for a variety of experiences. Stocked lakes can be managed for "quality" meaning fewer and larger fish, while lakes with low or moderate reproduction can be managed for higher catch rates. Individual smaller lakes should not be singled out in rule-making to prevent drawing attention. Catch limits should not be varied by lake because that focuses attention on certain lakes. |
| *Riparian vegetation* | Repair unneeded social trails. Close lake basins to camping or horses if needed. Educational materials should be provided to back country users discussing how to minimize trampling of vegetation by using rockslides or areas away from the shore for traveling. The use of lightweight fishing rafts also minimizes trampling. |
| *Camps* | Provide No Trace camping and hiking information to backcountry users. Trail Blazers worked with the Forest Service to develop a wilderness trailhead pamphlet called "The Off-Trail Challenge". This pamphlet discusses "No Trace" techniques such as: not marking route, travel on rock and snow instead of heather and boggy areas, and using a stove. |
| ***Maintaining the Fishery*** | |
| *Density of stocking* | Stocking density needs to be determined on a lake by lake basis using a number of factors related to reproduction potential and productivity. Figure |

| | |
|---|---|
| | 4 in Reference 1 shows that knowledge gained by WDFW through surveying has reduced the average stocked density from thousands/acre from 1933 to 1950 to a hundred/acre or less by the early 1980s. |
| *Frequency of stocking* | Stocking frequency needs to be determined on a lake by lake basis determined by a number of factors related to reproduction potential, productivity and angling effort. Figure 5 in Reference 1 shows that knowledge gained by WDFW through surveying has decreased the average stocking cycle frequency from every year or two before the 1940s to every 3 to 6 years since the 1960s. |
| *Reproductive status* | Reproductive status and potential for different fish species should be determined on a lake by lake basis through survey observations and by comparison with the same species in similar lakes. |
| ***Physical/Chemical*** | |
| *Chemical properties* | A suite of chemical field parameters and samples for laboratory analysis should continue to be monitored to help understand how the lakes are changing as a function of time. Cooperative research with agencies such as USGS and EPA should be carried out to determine effects of human activity in the Puget Sound basin on high lake chemistry. |
| *Water temperature* | Temperature depth profiles should be a part of all lake surveys. |
| *Ice Cover* | Periods of ice cover should be tracked on an ongoing basis using data from lake surveys and air and satellite photos. |
| *Weather/Climate* | Weather and climate models similar to those used by the Forest Service should be used to better understand the micro-climates on a $6^{th}$ or $7^{th}$ HUC level. |
| *Outlets* | Outlet substrates, flows and barriers (or lack of) should be identified for all lakes being managed for fish. |
| *Depth* | Bottom contours of the larger lakes should be developed. At least maximum depths and amount of fluctuation should be determined for all lakes and ponds. |
| *Area* | Maximum and minimum surface areas for many smaller ponds need to be determined. |
| *Substrates* | Littoral substrates and aquatic vegetation surveys and monitoring should be continued. |
| *Riparian Vegetation* | Plant surveys should be continued and expanded to determine trees, shrub and herb composition. Riparian research should be coordinated with the on-going Forest Service Northwest Forest Ecology research. |
| *Spawning habitat* | Spawning habitat and potential should be determined on a lake by lake basis through survey observations of inlets, outlets, and springs |
| ***Protecting Native Biota*** | |
| *Biodiversity/biological integrity* | Biological surveys should continue to be made of all the lakes that have fish management potential. These surveys should include nearby ponds, streams and wetlands to determine their biological interaction with the lakes. |
| *Sensitive species* | Information on sensitive species in the lakes and downstream reaches should continue to be monitored. Outlet barriers to fish passage should be identified to determine if downstream fish passage is possible (see Outlets). |

## PRELIMINARY MANAGEMENT ALTERNATIVES

- *Monitoring and research of mountain lake ecosystems, and restoration of highly impacted lakes (e.g. those with high densities of reproducing fish) would be elements common to all alternatives. Any alternative that involves continued stocking in the Park will require a policy waiver.*

**Trail Blazers support continuing monitoring and surveying of the mountain lake ecosystems and the building and maintenance of a database so that all the results can be analyzed for adaptive management and to help address future unknown issues. Trail Blazers support reducing high densities of reproducing fish.** For some lakes this might be accomplished by information promoting these lakes as good opportunities for success together with information on where to fish the lakes to reduce trampling and impacts on vegetation.

*A. No Action, or Continued Management. Continue current WDFW management in Park lakes (40 specified under MOU) and in NRA lakes (12 stocked +7 reproducing). 59 lakes total. (As required by NEPA, the No Action Alternative will examine existing conditions of lakes under their current management. Existing conditions will be used as a baseline for evaluating impacts of all other alternatives.)*

*B. Adaptively manage the mountain lakes fishery with additional criteria to protect biological integrity. Fishery would include some subset of lakes in the Park and in the NRAs with fish or a history of fish (83+11), including lakes with native fish (9). 103 total lakes. (Only lakes that can be shown to protect biological integrity would be managed. This alternative would require a policy waiver since lakes within the Park could potentially continue to be stocked.)*

*C. Same as "B" except the geographic scope would be limited to the 40 Park lakes specified under the MOU and the 19 NRA lakes. 59 total lakes. (This alternative would also require a policy waiver since lakes within the Park could potentially continue to be stocked.)*

*D. Discontinue stocking in all Park lakes. Adaptively manage 19 (12 stocked + 7 reproducing) NRA*

Of the preliminary alternatives presented here, **Trail Blazers support Alternative B recognizing that several lakes or ponds listed have no recreational fishing potential or very limited fishing potential.** Appendix B summarizes the list of 105 lakes in the NOCA Complex with a history of fish stocking or fish observations from the Trail Blazers High lake Database. Based on historic fishing surveys 90 of the 105 lakes are considered suitable for recreational fishing management (see following table). It is understood that an examination of these lakes using lake specific data may result in them being excluded from fish management based on their real impacts on sensitive native species.

| Fishing Potential | Number | Comment |
|---|---|---|
| NP = None | 11 | Lakes and ponds having no recreational fishing potential because they are very small or do not have a history of successful fish survival after stocking. Some, if not many, of these lakes provide excellent refuges for species typically preyed upon by fish. One of these lakes (Nert) is on the MOU. |
| PP = Poor | 27 | Lakes and ponds having poor recreational fishing potential because they are small beaver ponds or having a history of being marginal fish producers. Two of these lakes (Sweetpea and Torment) are on the MOU. |
| FP = Fair | 26 | Lakes and ponds having fair recreational fishing potential because of their fish survey history or are relatively large lakes and probably could support a fair fishery. Seven of these lakes are on the MOU |
| GP = Good | 41 | Lakes and ponds having good recreational fishing potential because of their fish survey history or are relatively large lakes and probably could support a good fishery. Thirty of these lakes are on the MOU. |

## References


1. Pfeifer, Bob, M. Swayne and B. Curtis. A Report on the Washington Dept of Fish and Wildlife's High Lake Fishery Management Program, Washington Department of Fish and Wildlife, Parametrix, Inc. Sep 2001.
2. Swayne, M.D. High Lake Data Management System, Trail Blazers Library.

Appendix A

**Lakes in NOCA Complex Basins With and Without Fish.**

| 6th Level HUC | Hydrologic Unit Code (HUC) Name | HUC Area (Sq. Mi.) | Total Lakes | MOU Lakes | Repro-ducing Lakes | Potential Fish Lakes |
|---|---|---|---|---|---|---|
| 170200090101 | Upper Bridge Creek-Above Maple | 55.01 | 28 | 3 | 3 | 5 |
| 170200090102 | North Fork Bridge Creek | 35.59 | 14 | 0 | 0 | 0 |
| 170200090103 | Flat Creek | 21.11 | 2 | 0 | 0 | 0 |
| 170200090104 | Upper Stehekin River-Agnes to Bridge | 39.28 | 9 | 2 | 2 | 2 |
| 170200090109 | Lower Stehekin River | 26.34 | 1 | 0 | 0 | 1 |
| 170200090110 | Company Creek | 27.37 | 15 | 0 | 3 | 10 |
| 170200090111 | Boulder Creek | 42.04 | 1 | 0 | 0 | 0 |
| 170200090202 | Chelan Upper North | 20.79 | 3 | 0 | 2 | 2 |
| 171100010101 | Depot Creek | 38.72 | 20 | 3 | 2 | 4 |
| 171100010102 | Indian Creek | 41.52 | 27 | 1 | 0 | 7 |
| 171100010201 | Silesia Creek | 35.31 | 8 | 0 | 0 | 0 |
| 171100040101 | North Fork Nooksack River Headwaters | 42.87 | 4 | 0 | 0 | 0 |
| 171100050101 | Silver Creek | 42.58 | 9 | 0 | 1 | 3 |
| 171100050102 | Little Beaver Creek | 53.74 | 51 | 0 | 0 | 5 |
| 171100050103 | Arctic Creek | 45.19 | 15 | 2 | 1 | 3 |
| 171100050105 | Big Beaver Creek | 40.94 | 34 | 0 | 0 | 0 |
| 171100050106 | Upper Skagit River-Big Beaver | 51.50 | 34 | 2 | 5 | 5 |
| 171100050201 | Lightning Creek | 46.09 | 1 | 0 | 0 | 1 |
| 171100050304 | Panther Creek | 61.81 | 7 | 2 | 0 | 3 |
| 171100050401 | Fisher Creek | 65.77 | 34 | 0 | 0 | 1 |
| 171100050402 | Thunder Creek | 60.15 | 14 | 0 | 1 | 5 |
| 171100050403 | Stetattle Creek | 48.62 | 21 | 2 | 1 | 5 |
| 171100050404 | Newhalem Creek | 27.33 | 30 | 4 | 4 | 5 |
| 171100050405 | Goodell Creek | 39.37 | 6 | 1 | 1 | 2 |
| 171100050501 | Skagit River-Thornton Creek | 33.07 | 26 | 4 | 2 | 5 |
| 171100050502 | East Fork Bacon Creek | 19.03 | 5 | 1 | 0 | 1 |
| 171100050503 | Bacon Creek | 32.02 | 24 | 4 | 3 | 5 |
| 171100050504 | Diobsud Creek | 26.57 | 13 | 2 | 1 | 3 |
| 171100050505 | Skagit River-Copper Creek | 23.89 | 2 | 0 | 0 | 0 |
| 171100050601 | Cascade River Forks | 58.69 | 7 | 2 | 1 | 2 |
| 171100050603 | Middle Cascade River | 56.01 | 7 | 0 | 0 | 0 |
| 171100050604 | Lower Cascade River-To Marble | 46.91 | 14 | 1 | 1 | 1 |
| 171100050801 | Pass Creek | 46.73 | 8 | 0 | 0 | 0 |
| 171100050802 | Upper Baker River | 39.54 | 23 | 4 | 3 | 3 |
| 171100050803 | Upper Baker Lake | 34.61 | 13 | 0 | 0 | 0 |
| | | | | | | |
| **Total sum** | | **1,462** | **530** | **40** | **37** | **90** |
| **Total sq mi** | | | **1,462** | **704** | **855** | **1,012** |